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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------------|------------------|
| 10/671,485 | 09/29/2003 | Fangguo Zhang | ZHAN3003 / EM | 8456 |
| 23364 7590 02/06/2007 BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314 | | | EXAMINER TO, BAOTRAN N | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2135 | |
| SHORTENED STATUTORY PERIOD OF RESPONSE | | MAIL DATE | DELIVERY MODE | |
| 3 MONTHS | | 02/06/2007 | PAPER | |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/671,485 | Applicant(s) ZHANG ET AL. | |
| | Examiner Baotran N. To | Art Unit 2135 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-12 are pending in the application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boneh et al. (U.S. Patent 7,113,594 B2) hereinafter Boneh in view of Rivest, Shamir and Tauman (How to leak a secret, Advances in Cryptology-Asiacrypt 2001, LNCS 2248, pp.552-565, Springer-Verlag, 2001) hereinafter Rivest.

Regarding Claims 1 and 11, Boneh discloses a method for generating an identity-based ring signature by using bilinear pairings, in a cryptosystem that includes a user (receiver), a signer (sender) and a trusted authority (PKG 1003), which comprises the steps of:

at the trusted authority generating a set of system parameters (Parameters) shared by the user and the signer and storing the set of system parameters in a memory of each of the user and the signer (Abstract; Figure 10, col. 30, lines 17-28);

at the trusted authority, generating a public key and a private key for the user and the signer by using the set of system parameters, thereby transmitting the generated public and the private keys to the user and the signer through a secure channel, respectively (Figure 2, elements 220, 230, and 240, col. 15, lines 45-54);

at the user, concealing content of a message (col. 26, lines 28-40).

Boneh explicitly does not disclose "requesting a ring signature for the content-concealed message to the signer; at the signer, producing the ring signature based on identity (ID) of the user, thereby forming an ID-based ring signature for the content-concealed message; and at the user, verifying validity of the ID-based ring signature."

However, RSA discloses requesting a ring signature for the content-concealed message to the signer (Abstract, page 552); at the signer, producing the ring signature based on identity (ID) of the user, thereby forming an ID-based ring signature for the content-concealed message (pages 559-560); and at the user, verifying validity of the ID-based ring signature (pages 560-561).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated Rivest's reference within Boneh to include requesting a ring signature for the content-concealed message to the signer; at the signer, producing the ring signature based on identity (ID) of the user, thereby forming an ID-based ring signature for the content-concealed message; and at the user, verifying validity of the ID-based ring signature. One of ordinary skill in the art would have been motivated to specify a set of possible signers without revealing which member actually produced the signature (Rivest, Abstract).

Regarding Claim 2, Boneh and Rivest disclose the limitations of Claim 1 above. Boneh further discloses wherein the step (a) includes the steps of: (a1) introducing a cyclic group G of an order q by means of a generator P , wherein the cyclic group G is an elliptic or hyper-elliptic curve Jacobian; (a2) producing a multiplicative cyclic group V of the order q by using a bilinear pairing e expressed as the following Equation: $e: G \times G \rightarrow V$ (a3) determining cryptographic hash functions $H: [0,1]^* \rightarrow Z_q^*$ and $H1: \{0,1\}^* \rightarrow G$; wherein Z_q^* is a multiplicative cyclic group corresponding to V ; and (a4) selecting a master key s of the trusted authority and preparing a public key P_{pub} of the trusted authority by using the master key s and the generator P by using the following Equation $P_{pub}=s.P$ (Figures 3-4 and 7, col. 5, line 60 through col. 6, line 56).

Regarding Claim 3, Boneh and Rivest disclose the limitations of Claim 2 above. Boneh further discloses wherein the set of system parameters has G , q , P_{pub} , P , H and $H1$ (col. 3, lines 30-45).

Regarding Claim 4, Boneh and Rivest A disclose the limitations of Claim 3 above. Boneh further discloses wherein the public key QID_i and the private key SID_i of the user are stored in a memory of the user, which are defined by using the following Equations: $QID_i=H1(ID_i)$ and $SID_i=s.QID_i$ where ID_i is the user's identity, i being a user index which is an integer ranging from 1 to n (col. 6, lines 25-45).

Regarding Claim 5, Boneh and Rivest disclose the limitations of Claim 4 above. Rivest further discloses wherein the step (d) includes the steps of: (d1) selecting an ID list L, wherein L is a set of identities of users; (d2) extracting a random element A of the cyclic group G, thereby computing an initial signature value by using the ID list L; (d3) choosing a random value of the cyclic group, thereby computing additional signature values by using the ID list L; (d4) generating a ring signature value by using the private key of the signer; (d5) forming a ring of ring signature values by selecting zero as a glue value of the additional signature values; and (d6) storing in a memory of the user the ID-based ring signature of n+1 ring signature values (pages 552-565).

Regarding Claim 6, Boneh and Rivest disclose the limitations of Claim 5 above. Boneh further discloses wherein, at the signer, the initial signature value, $ck+1$, is computed by using the following Equation: $ck+1 = H(L || m || e(A, P))$, wherein k is a signer index and m is the content-concealed message (Abstract, col. 4, lines 15-30).

Regarding Claim 7, Boneh and Rivest disclose the limitations of Claim 6 above. Boneh further discloses wherein an additional signature value is computed by using the following Equation: $ci+1 = H(L || m || e(Ti, P)e(ciH1(IDi), Ppub))$ for "i" corresponding to one of values of all modulo n ($k+1, \dots, n-1, 0, 1$ and $k-1$), and then stored in a memory of the signer wherein Ti is the random value of the cyclic group G (col. 29, lines 1-10).

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Regarding Claim 8, Boneh and Rivest disclose the limitations of Claim 7 above. Boneh further discloses wherein the ring signature value, T_k , is calculated by using the following Equation: $T_k = A - c_k S_{IDk}$; and stored in a memory of the signer (Figures 10-12, elements 1106, 1107, col. 30, line 1 through col. 33, line 4).

Regarding Claim 9, Boneh and Rivest disclose the limitations of Claim 8 above. Boneh further discloses wherein the ID-based ring signature is a sequence $(c_0, T_0, T_1, \dots, T_{n-1})$, which is stored in a memory of the user (Figures 10-12, elements 1106, 1107).

Regarding Claim 10, Boneh and Rivest disclose the limitations of Claim 9 above. Rivest further discloses wherein the validity of the ID-based ring signature is determined by using the following Equations:

$$c_{k+1} = H(L \parallel m \parallel e(A, P))$$

$$c_{k+2} = H(L \parallel m \parallel e(T_{k+1}, P) e(c_{k+1} H_1(ID_{k+1}), P_{pub}))$$

$$c_n = H(L \parallel m \parallel e(T_{n-1}, P) e(c_{n-1} H_1(ID_{n-1}), P_{pub}))$$

$$c_1 = H(L \parallel m \parallel e(T_0, P) e(c_0 H_1(ID_0), P_{pub}))$$

$$c_2 = H(L \parallel m \parallel e(T_1, P) e(c_1 H_1(ID_1), P_{pub}))$$

$$c_k = H(L \parallel m \parallel e(T_{k-1}, P) e(c_{k-1} H_1(ID_{k-1}), P_{pub}))$$

wherein if $i=0, 1, \dots, n-1$ and $c_n=c_0$, then the ID-based ring signature is determined to be valid; and if otherwise, the ID-based ring signature is rejected (pages 552-565).

Regarding Claim 12, Boneh and Rivest disclose the limitations of Claim 11 above. Boneh and Rivest further disclose the system parameters includes: a cyclic group G ; G 's order q ; G 's generator P ; the trusted authority's public key P_{pub} described by $P_{pub}=s.P$, where s is the master key (Figures 3-4 and 7, col. 5, line 60 through col. 6, line 56 of Boneh); and

hash functions H and H_1 described by $H: \{0,1\}^* \rightarrow Z_q^*$ and $H_1: \{0,1\}^* \rightarrow G$, where Z_q^* is a cyclic multiplicative group, wherein the bilinear pairings e are defined by $e: G \times G \rightarrow V$, where V is a cyclic multiplicative group of the order q and uses cyclic multiplicative group Z_q^* (col. 3, lines 30-45 of Boneh),

the user's public key QID_i is described by $QID_i=H_1(ID_i)$, where ID_i is the user's identity, i being a user index which is an integer ranging from 1 to n , the user's private key SID_i is described by $SID_i=s.QID_i$ (col. 6, lines 25-45 of Boneh),

the initial signature value is computed by $ck+1=H(L || m || e(A, P))$, where k is a signer index, L is a set of identities of users, m is a content-concealed message to be ring-signed and A is a random element of the cyclic group G (Abstract, col. 4, lines 15-30 of Boneh),

the additional signature values are generated by $ci+1=H(L || m || e(T_i, P)e(ciH_1(ID_i), P_{pub}))$, for " i " corresponding to one of values of all modulo n ($k+1, \dots, n-1, 0, 1, k-1$), where T_i is a random value of the cyclic group G (col. 29, lines 1-10 of Boneh),

the ID-based ring signature value, T_k , is calculated by $T_k=A-ckSID_k$ (Figures 10-12, elements 1106, 1107, col. 30, line 1 through col. 33, line 4 of Boneh),

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the ID-based ring signature is obtained in a form of a sequence $(c_0, T_0, T_1, \dots, T_{n-1})$ (Figures 10-12, elements 1106, 1107 of Boneh), and

the validity of the ID-based ring signature is determined by means of the following Equations:

$$c_{k+1} = H(L \parallel m \parallel e(A, P))$$

$$c_{k+2} = H(L \parallel m \parallel e(T_{k+1}, P) e(c_{k+1} H_1(ID_{k+1}), P_{pub}))$$

$$c_n = H(L \parallel m \parallel e(T_{n-1}, P) e(c_{n-1} H_1(ID_{n-1}), P_{pub}))$$

$$c_1 = H(L \parallel m \parallel e(T_0, P) e(c_0 H_1(ID_0), P_{pub}))$$

$$c_2 = H(L \parallel m \parallel e(T_1, P) e(c_1 H_1(ID_1), P_{pub}))$$

$$c_k = H(L \parallel m \parallel e(T_{k-1}, P) e(c_{k-1} H_1(ID_{k-1}), P_{pub}))$$

wherein if $i=0, 1, \dots, n-1$ and $c_n=c_0$, then the ID-based ring signature is accepted to be valid; and if otherwise, the ID-based ring signature is rejected (pages 552-565 of Rivest).

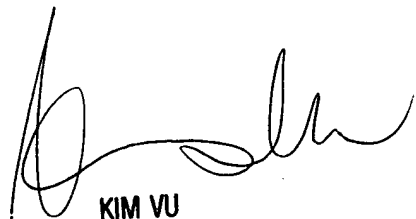
Contact Information

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Baotran N. To whose telephone number is 571-272-8156. The examiner can normally be reached on Monday-Friday from 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Y. Vu can be reached on 571-272-3859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BT
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